Layered Metaigneous Complex of the Veporic Basement with Features of the Variscan and Alpine Metamorphism (the Western Carpathians, Slovak Republic).

Ivana FILOVÁ¹, Ján MADARÁS¹ and Marián PUTIŠ²

¹ Dionýz Štúr Geological Institute, Mlynská dolina 1, 817 04 Bratislava, Slovak Republic
² Department of Petrology and Mineralogy, Faculty of Natural Sciences, Comenius University, Mlynská dolina G, 842 15 Bratislava, Slovak Republic

Geological setting

The Veporicum is an internal part of the central domain of the Western Carpathians and it is an area consisting of several tectonically approached units with different age. The layered metaigneous complex (LMC) is a part of the Veporic basement of the Central Western Carpathians. This complex is regionally widespread in the northwestern part of the Slovenské Rudohorie Mts. and the eastern part of the Nizke Tatry Mts. The studied basement complex was originally termed as the gabbro-peridotite-basalt formation (Miko and Putiš, 1989 in Krist et al., 1992) in the area of the eastern Low Tatras Mts. It was included into the leptynite-amphibolite complex (LAC, Hovorka and Méres, 1993). The layered metamagmatic-amphibolite rocks are part of the pre-Alpine Čierny Balog (CB) supracrustal complex. The CB complex is mainly represented by Ky-Grt gneisses, migmatic gneisses and common to partially melted amphibolites.

Lithological composition of the layered metaigneous complex

Layered metaigneous complex is mainly represented by porphyritic Qtz meta-diorites, which were dated approximately at 346 Ma. U – Pb on Zr. Layered metadiorites, in form of layered (banded) amphibolites, appear to be an inseparable part of metadiorites. Thus, at least a part of layered amphibolites appear to have magmatic origin in dioritic protoliths. Strongly layered parts of metadioritic body contain rare 2–3 dm fragments of metagabbros (Amph – Px + Pl). Amph-rich layers of metadioritic composition, or pale tonalitic to trondhemitic layers are also present within the metadioritic bodies less than 100 m thick. Undifferentiated dioritic parts have composition which is an average of the dark (Amph, Pl, Ttn, + Qtz) and pale (Pl, QTz, Mgt, + Amph, + Bt) bands. A special lithological member appears to be layered amphibolite (resembling leptynite-amphibolites, e.g., Neubauer, 1989; Hovorka et al., 1992; Putiš, 1992) thus representing a characteristic pre-Alpine lithological feature of the layered metaigneous complex.

The most likely mechanism of the relic magmatic layering appears to be magmatic laminar flow, accompanying differentiation and alignment of Pl and Am mega- and microcrysts parallel to the direction of flow, e.g., in porphyric (meta)diortites (e.g., Parsons, 1987; Fountain et al., eds. 1992; Percival et al., 1992; Shelley, 1992; Hall, 1996). The development of layering was influenced by the extensional emplacement conditions of the magmatic sills into the shear zone accompanying an extensional detachment fault. Thus a continuous evolution of the magmatic to subsolidus and solidus foliation might have...
formed (e.g., Patterson et al., 1989, 1990; Shelley, 1992). The mentioned conditions might have caused the thinning of already magmatically differentiated and mixed sills, controlled by propagation (opening) of an extensional shear zone. All lithological members were thinned and stretched into straight bands with sharp boundaries, changing the mineral grain size, due to superimposed strong ductile deformation and recrystallization at medium-T conditions within a deep-crustal shear zone.

Deformation-recrystallization stages
It is possible to distinguish the next deformation-recrystallization stages in the main types of rocks:
1. Metadoriotes to metagabbrodiorites
   DR1 (prograde burial, Variscan): Am1 (Mg-Hbl, edenite paragneiss?'), Pl, Qtz, Ep-Czo, Grt, Bt1, ±Ttn
   DR2-1 (extensional exhumation, Variscan): Am2 (Ts), Pl, Grt
   DR2-2 (late Variscan? or Alpine cooling): Am2 (Act), Ab, Chl2, Bt2, Ms-Phe, ±Cld, Grs
2. layered metadoriotes amphibolites (magmatic, subsolidus and solidus layering)
   DR1 (prograde, Variscan): Am1 (Mg-Hbl), Chl1, Qtz, Pl, Bt1
   Moreover, Px diopside of metahornblenditic lenses is replaced by Mg-Hbl(1).
   DR2-1 (extensional exhumation, Variscan): Am2 (Ts), Grt, Czo, Phe
   DR2-2 (late Variscan? or Alpine cooling): Am2 (Act), Ab, Ms, Bt2, Chl2, Grs, ±Cld

References


Lithological and Sedimentological Evolution of the Cambrian in the Měnín – 1 Borehole

Helena GILÍKOVÁ1, Jaromír LEICHMANN2, Radek MIKULÁŠ3 and Slavomír NEHYBA2

1 Czech Geological Survey, Leitnerova 22, 658 69 Brno, Czech Republic
2 Department of Geology and Paleontology, Faculty of Science, Masaryk University, Kotlářská 2, 611 37 Brno, Czech Republic
3 Institute of Geology, Academy of Sciences, Rozvojová 135, 165 02 Praha 6, Czech Republic

The Lower Paleozoic clastic sediments (so-called “old red formation”) are assumed to be the oldest sedimentary formation overlaying the Precambrian Brunovistulian unit. These sediments have been originally described by the number of authors as “basal Devonian clastics” (Dvořák, 1998; Skoček, 1980 etc.). More recently, Lower Cambrian sediments were found in the boreholes Měnín 1 and Němčíčky 3, Němčíčky 6 (Jachowicz and Přichystal, 1997).

The Měnín borehole is situated 20 km to the south-east of Brno. The borehole is 2100m deep, the crystalline basement has not been reach. The Lower Cambrian microfossils of Acritarcha genus were identified at depth of 475–477,5 m (Jachowicz and Přichystal, 1997; Fatka et al., 1998). The sediments below the horizon with Acritarcha are considered to be of Cambrian age.

Petrological character of the studied sediments is monotonous. To the depth of 900 m grey to greenish grey fine to coarse-grained well-sorted quartzitic sandstones prevail over red to violet coloured arcosic sandstones. Below the 900 m red to violet coarse to fine-grained arcoses, greywacke sandstones with variable amounts of finer grained members were penetrated by the borehole Měnín. Three types of quartz, zoned K-feldspar, plagioclase, muscovite and biotite were observed in CL microscope. Zircon, tourmaline and apatite are common accessories. The rare cement is composed of recrystallized kaolinite or carbonate. The mineral composition of sediments and internal fab-